THE EFFECT OF RELIGIOUS PRIMING ON RECALLED REGRETS

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THESIS

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ABSTRACT

Recent research has demonstrated the effects of religious priming on cognition and behavior in the present. For example, priming participants with religious concepts promotes cooperation in economic games (Shariff & Norenzayan, 2007) and increases public self-awareness (Gervais & Norenzayan, 2012). Theories used to explain these effects typically focus on religion's role in regulating social and moral behavior and building and binding together cooperative communities (e.g., Graham & Haidt, 2010; Shariff, et al., 2009). Several religions incorporate reflections on past behavior as part of their religious practice. Might religious priming also serve to affect how people think about their pasts? Research suggests that feelings of regret help to regulate behavior by making decision-making processes more careful (Reb, 2008) and behavior less risky (Richard, van der Pligt, & de Vries, 1996). Likewise, repetitively recalling regrets can promote improved behavior (Morrison, 2012). Based on these findings, I predicted that religious priming would influence the recall of regrets in four ways: (1) by making interpersonal regrets more accessible, (2) by increasing the experience of self-conscious emotions, (3) by making regrets more likely to be framed as actions (rather than inactions), and (4) by making moral regrets more accessible. Although four studies found no consistent evidence for any of these hypotheses, a meta-analysis of the reported studies revealed a small effect of religious priming on recall of interpersonal regrets. I discuss the implications for theories of religion.

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CHAPTER 1

INTRODUCTION

Imagine that someone found out about one your worst secrets—something you had done but deeply regretted, like having bullied another student in high school. How would you feel? Probably embarrassed, ashamed even. What if the "person" who found out your embarrassing secret was God? Would this make you feel better or worse? You might feel remorseful and reflect on the moral shortcoming demonstrated by your behavior or how your behavior reflects on you as a friend or family member. Have you lived up to God's high standards for appropriate personal and social behavior?

Psychologists have become increasingly interested in how we feel and behave towards other people when we believe that God is watching us. Research has shown, for example, that reminders of supernatural beings makes people less likely to cheat (Bering, McLeod, & Shakleford, 2005; Piazza, Bering, & Ingram, 2011) and more generous towards others (Shariff & Norenzayan, 2007). Much of this work has been motivated by the *supernatural monitoring hypothesis*, the idea that when we believe we are being watched, even by an invisible and supernatural being, we feel more self-conscious and worry about how our behaviors will be perceived by our observers (Bering & Johnson, 2005; Gervais & Norenzayan, 2012; Johnson & Bering, 2006; Shariff, Norenzayan, & Henrich, 2009). This concern, in turn, makes us more cooperative, kind, and generous because we do not want to be seen performing bad behaviors or failing to perform good ones.

However, little attention has been given to the question of what effect religious priming may have on how we feel about our past behaviors. This is surprising because reflection on past behavior, especially past shortcomings and transgressions, is an important component of many

religions. Examples of such practices include Confession in Catholicism (where members confess their sins to a priest), Istighfar in Islam (the practice of asking Allah for forgiveness), and Yom Kippur in Judaism (a holiday which involves confession of sins and repentance). Because the gods of many religions are believed to have privileged access to observing not only the behaviors but also the minds of their followers (see Bering & Johnson, 2005 for a review), people who are thinking about God while recalling their past failures may be keenly aware of God's knowledge of these events and of His judgments regarding them. God's special access to mental content allows Him to observe not only behavior but also its recall. This may, in turn, increase feelings of guilt, remorse, or shame regarding these past events and even affect the kinds of events recalled. In this paper, I report four studies investigating hypotheses about the effect of religious priming on recalled regrets and a meta-analysis of their findings. First, however, I provide a review of the literature that supports these hypotheses.

1.1 Religion

Theories that explain religion's effects on human behavior tend to emphasize two mechanisms. First, as described above, belief in supernatural agents (i.e., beings who can think and who have goals, intentions, and desires) is explained by positing that their imagined presence makes people feel observed, even when they are alone, and therefore makes them behave more cooperatively than they would otherwise. A second group of theories attempts to explain religion's role in human behavior by evoking its ability to provide stronger social ties to others, binding them together into cohesive and cooperative groups. Both of these accounts have in common an emphasis on *social vigilance*—increased awareness of one's social environment and precaution for preserving one's social standing within a group. Below, I review some of the arguments and evidence in favor of both the supernatural monitoring and the binding religion

accounts.

1.1.1 Supernatural Monitoring

The supernatural monitoring hypothesis begins with a simple premise: when we think someone is watching, we behave better. Religion informs us that we are *constantly* being watched by invisible agents, and this observation is not just limited to our behaviors. These agents know our minds as well. Consider, for example, the opening of Psalm 139, addressed to God, "You know when I sit and when I rise / you perceive my thoughts from afar." Thus, supernatural agents know when we even *think* about doing bad things—when we are tempted by greed to cheat, when we are inspired by rage to ponder the gruesome deaths of those who have wronged us, and when we are driven by jealousy to wish misfortune on our rivals. Our rich ability to imagine how God's mind listens to and judges our own minds is the bedrock of the supernatural monitoring hypothesis (Bering & Johonson, 2005). Recent work has supported this link, suggesting that those who struggle to imagine the contents of others' minds are less likely to believe in God (Norenzayan, Gervais, & Trzesniewski, 2012).

Although God can know everything we think, He is most concerned about the thoughts and behavior that impact our social relationships (Boyer, 2001; Barrett, 2008). God cares little whether you are fantasizing about owning a red or a green dress; He cares whether you're pondering stealing it (and thereby harming someone) or buying it (and thereby contributing to others' welfare). A God who cared more about which color you wore than whether or not you stole would not be a very useful social concept. Thus, God is a mindreader but a selective one: He has access to your thoughts but cares most about whether they reveal you to be a good or a bad social actor.

The power of God's mind-reading to influence behavior is thought to act through self-

consciousness (Bering & Johnson, 2005; Johnson & Bering, 2006). When we imagine God listening in on our desires to steal a coveted item, we are prevented from acting on or even lingering too long on such thoughts because of self-conscious feelings of guilt, shame, and embarrassment over how those thoughts make us look to God. This has been supported in recent work that found that religious priming increased public self-awareness (concern for how one appears to others, Gervais & Norenzayan, 2012). Being reminded of a supernatural watcher may make you feel that the contents of your mind are exposed. When that supernatural watcher observes recollections of your past failures, the awareness of this morally concerned observer may heighten the experience of regret, remorse, shame, embarrassment, and guilt.

1.1.2 Binding Religion

Of course, religion is not all shame, guilt, and bad feelings. Scientists studying religious behavior have concluded that one of the most robust benefits of religious participation is improved social relationships. This conclusion is supported by a great deal of evidence. First, religious believers, in contrast to non-believers, have greater social support and respect (Diener, Tay, & Myers, 2011). That is, religion brings the religious into closer contact with others, allowing them to build relationships based on trust, mutual concern, and shared activities. Second, religious people tend to be more agreeable than their non-religious counterparts (Saroglou, 2002). They get along well with others and are empathetic and trusting. Third, communal life is uniquely promoted by a religious foundation. In a study of communes in the United States, Sosis and Bressler (2003) found that religious communes lasted longer and experienced greater cohesion when they enacted costly rules, such as ritual participation, on their members. Secular communes did not derive similar benefits from such rules and were more likely than religious communes to fall apart due to internal strife. Religion, it seems, make social

living easier and more beneficial for individuals by promoting adaptive social behavior (e.g., cooperation, community involvement, and social self-regulation).

These benefits are achieved by tight regulation of social behavior (e.g., rituals, moral codes, and worship attendance) that brings the religious into closer contact with others and encourages prosocial behavior towards ingroup members. Thus, religious priming leads to cooperation (Shariff & Norenzayan, 2007), submission (Saroglou, Corneille, & Van Cappellen, 2009) and conformity (Van Cappellen, Corneille, Cols, & Saroglou, 2011).

Both the supernatural and behavioral components of religion promote social vigilance. The first by activating self-conscious awareness that one's thoughts and behaviors are exposed to judgment and the second by encouraging close bonds with ingroup members through strongly regulated social behaviors.

1.2 Regrets

The theoretical focus on God as a supernatural watcher and religion as a social bond has interesting implications for regrets. Religious practices that involve reflecting on past bad behavior may have survived because they allow adherents to take advantage of regret's benefits and promote enhanced decision-making and behavior in the social domain.

Regret, a negative emotional experience associated with one's past behavior, improves decision-making and behavior. Research suggests that anticipating regret makes decision-making slower and more careful (Reb, 2008) and behavior less risky (Richard, van der Pligt, & de Vries, 1996). Likewise, recalling regrets (i.e., how things could have turned out better) feels bad in the short term but improves behavior in the long term, when compared to thinking about how things could have been worse or simply factually recalling events without reflecting on how they could have been different (Morrison, 2012). Reflecting on regrets, especially interpersonal regrets, thus

may promote the social self-regulation necessary for preventing transgressions of religious codes. Furthermore, being reminded that God is a witness to both the regretted behavior and its recall may make one feel even more remorseful, ashamed, or embarrassed. My first two hypotheses, then, are that religious priming ought to increase (a) the recall of regretted interpersonal behaviors and (2) the self-conscious emotions associated with recalled regrets.

In addition to evoking negative emotional experiences, regrets have several characteristic cognitive features. One of these is whether a regret is framed as an action—something I did but wish I did not do—or as an inaction—something I did *not* do but wish that I did. Most regrets can be framed in either way. Did I sleep in this morning or did I not get up on time? Sleeping in is an action—something I regret doing—but not getting up on time is an inaction—something I regret not doing. Previous research has suggested that the action/inaction framing of regrets can be influenced by priming (Rosenzweig & Gilovich, 2012).

Religious priming may influence how people frame their regrets because actions are more visible than inactions. For example, you might not know what time I was supposed to get up this morning, and so you might not know that I did not get up on time. But if you called me at 10 AM and I told you that you had woken me, you would know that I had slept in, regardless of whatever time I was supposed to get up. It is perhaps for this reason (that it is easier to see what someone does than to see what they do not do) that people judge moral commissions (e.g., lying) more harshly than moral omissions (e.g., not telling the truth) (Cushman, Young, & Hauser, 2006; Spranca, Minsk, & Baron, 1991). Not surprisingly then, recent evidence suggests that people associate greater self-conscious emotion and harsher moral judgment with their action regrets than their inaction regrets (Kedia & Hilton, 2011). If someone is made keenly aware that their present thoughts and previous actions are known to an observer, such as God, they might be

more likely to frame their regrets from the perspective of an observer—that is, as actions. Thus, my third hypothesis is that religious priming will increase the likelihood that regrets will be framed as actions.

Regrets may also differ in the moral or amoral nature of the regretted behavior. The supernatural monitoring hypothesis proposes that God is primarily concerned with our moral behavior. Although I might regret having bought a Honda instead of a Toyota, why would God care about this? In contrast, God might be very interested in the regret I would experience if I intentionally hit a pedestrian with my Honda (or Toyota). If I am thinking about the judgment of a watchful supernatural agent while recalling events from my past, I might recall more of the kinds of regrets that would interest that agent: namely, moral regrets. Thus, my fourth hypothesis is that religious priming will increase the recall of moral regrets.

1.3 The Present Studies

In the following chapters, I report on a series of studies designed to test these four hypotheses:

- H1) Religious priming will increase the proportion of regrets relating to interpersonal concerns.
- H2) Religious priming will increase self-conscious emotions experienced by participants;
- H3) Religious priming will increase the proportion of recalled regrets framed as actions rather than inactions; and
- H4) Religious priming will increase the proportion of regrets participants judge to be moral.

As discussed, current theories of religion argue that religion serves two main social vigilance

functions: to increase good behavior through the feeling of supernatural observation and to bind people together into cohesive communities. Thus, I predict that when participants reflect on their past behaviors, thinking about the watchful presence of God will make them more keenly aware of the moral and social concerns associated with religion.

In four different studies, I used semantic priming procedures to activate the concept of God and then asked participants to report their regrets and emotions.

CHAPTER 2

STUDY 1

2.1 Overview

Study 1 examined the effects of religious priming on recalled regrets. In this study, I predicted that priming participants with the word *GOD* would increase (1) their recall of interpersonal regrets, (2) their experience of self-conscious emotions, (3) their recall of action regrets, and (4) their recall of moral regrets when compared to participants primed with a religiously neutral word. Participants first completed a supposed "visual processing task" during which they were subliminally primed with either the word "GOD" or the word "HAT." Next, they completed a regret recall questionnaire, an emotion inventory, the Guilt and Shame Proneness (GASP) Scale (Cohen, Wolf, Panter, & Insko, 2011), and a measure of religiosity (see Appendix A; Shariff, Cohen, & Norenzayan, 2008). Because both reminders of watchful supernatural agents (Gervais & Norenzayan, 2012) and action regrets (Kedia & Hilton, 2011) are associated with increased self-consciousness, I expected that people would activate a self-conscious mindset when confronted with the religious prime word and that this would bias their regret recall toward action regrets. Likewise, because religion is associated with both moral and social vigilance (e.g., Graham & Haidt, 2010), I expected that the religious prime word would make regrets with moral and social content more accessible.

2.2 Method

2.2.1 Participants

Sixty-nine undergraduates (45 women, 24 men, M_{age} = 19) participated in the study for partial course credit in an introductory psychology course during the spring. Participants were not prescreened for any conditions other than being at least 18 years old.

2.2.2 Procedure

Each participant was seated at a computer in a private experiment room and told the study was about the relationship between visual processing and people's attitudes and experiences. All instructions and stimuli were presented on the computer using DirectRT and MediaLab. Participants were told to begin the study and allowed to complete it at a self-directed pace.

Participants began the study with a "visual processing task" that was in reality 30 trials of a subliminal priming procedure. Instructions told them to focus on the center of the screen and press the spacebar as quickly as possible when they saw flashing symbols appear. Each trial consisted of a focal point (+; 2000 ms), followed by a pre-mask (%%%%%; 5 ms), prime word (GOD or HAT; 15 ms), and post-mask (%%%%%, displayed until spacebar was pressed). Participants were randomly assigned to either the God or control condition.

After completing all 30 trials, participants began the regret questionnaire, which consisted of one open-ended question asking participants to recall a specific regret from their pasts and several follow-up questions designed to probe the structure and content of the regret. Two of these questions were instructional checks used to determine if participants had entered valid regrets: "Did you ensure that what you described focused on YOUR actions or inactions?" and, "Did you ensure you focused primarily on how things could have turned out better?" Since regret, by definition, is a negative emotion related to one's own past behavior, focused on an upward counterfactual (i.e., a *better* alternative outcome than what actually happened; Epstude & Roese, 2008), these questions served to check whether participants had entered valid data in response to the regret question. Next, participants were asked whether the regret was one of action or inaction ("Did what you wrote focus primarily on something you wish you DID do, or

something you wish you did NOT do?") and then to rate how important the regret was ("How important is this regret?") on a five-point sematic differential scale (1 = *unimportant*; 5 = *important*). Finally, participants were asked three questions designed to probe the moral content of their regret: "Do you think that the actions that brought on this regret are of a moral nature?", "Does your regret relate to a time that you hurt someone?", and "Does your regret relate to a time that you could have helped someone but didn't?" (all answered in a yes/no format).

Participants were then asked to rate how much they felt each of 30 different emotions *right now* (see Appendix B for the complete list of emotions) on a five-point scale (1 = *not at all*; 5 = *very much*). The emotions included the dependent variables, self-conscious emotions (e.g., *guilt*, *shame*), as well a set of control emotions, consisting of positive emotions (e.g., *happiness*, *contemplation*) and non-self-conscious negative emotions (e.g., *anger*, *disgust*). The list of self-conscious emotions was derived from work on the association of action regrets with self-conscious emotions (Kedia & Hilton, 2011) and the lists of positive and negative emotions were derived from this same work and the positive emotion and negative emotion sub-scales of the Positive and Negative Affect Schedule (PANAS; Watson & Clark, 1994). Emotions were presented one at a time, in a random order.

Next, participants completed the Guilt and Shame Proneness (GASP) scale (Cohen, Wolf, Panter, & Insko, 2011). The GASP scale is intended to measure the proneness of individuals to the characteristic action tendencies and evaluative tendencies associated with guilt and shame. The scale consists of 16 questions, each of which asks participants to imagine themselves in a hypothetical scenario and then rate the likelihood that they would feel or behave a certain way on a seven-point scale (1 = *very unlikely*; 7 = *very likely*). For example, one question gives the following scenario, "After realizing you have received too much change at a store, you decide to

keep it because the salesclerk doesn't notice," and then asks, "What is the likelihood that you would feel uncomfortable about keeping the money?" The GASP scale has four subscales: Guilt–Negative Behavior Evaluation (the tendency to negatively evaluate one's private transgressions), Guilt–Repair (the tendency the attempt to make up for one's private transgressions), Shame–Negative Self Evaluation (the tendency to negatively evaluate oneself after public transgressions), and Shame–Withdrawal (the tendency to withdraw from social contact following public transgressions).

At the end of the survey, participants completed a demographics questionnaire, which included questions about age, gender, ethnicity, religious affiliation, education, household income, and sexual orientation. At the end of the study, participants were asked about their suspicions regarding the priming procedure and hypotheses. They were then debriefed about the purpose of the study and the nature of the priming procedure.

2.3 Results

Data from nine participants were excluded due to invalid responses to the regret questions (i.e., participants wrote about the visual processing task, stated they do not have any regrets, or otherwise failed to follow directions). This left data from 27 and 33 participants in the GOD and HAT conditions, respectively, to be analyzed.

For brevity, means are reported below (and in subsequent studies) only for significant or marginally significant effects. Full statistics (including means, *t*-values, *p*-values, and effect sizes) for t-tests in all studies are reported in Table 1 (Chapter 5).

2.3.1 Interpersonal Regrets

I coded each regret's content either as related to interpersonal concerns (e.g., not spending enough time with family members or fighting with a friend) or as not related to interpersonal

concerns (e.g., about educational or career choices). For the purposes of this coding, I defined *interpersonal* regrets as those that dealt with relationships with friends and family members. Romantic interests were not included in the interpersonal domain in part because of the young age of the participants (i.e., they likely have little experience with serious romantic relationships) and because these relationships (excepting marriage) are less connected to the maintenance of social ties, ritual behavior, and community membership than are friends and family relationships.

I rated 38.3% of regrets as interpersonal and 61.7% of regrets as not interpersonal. A Pearson's chi-squared test of my coding revealed a marginally significant difference, $\chi^2(1) = 3.197$, $p = .07$, such that participants in the HAT condition were more likely to report interpersonal regrets (48.5% of regrets) than were participants in the GOD condition (25.9% of regrets).

To test whether priming influenced the perceived importance of interpersonal regrets, I performed a 2 (Condition: GOD or HAT) x 2 (Interpersonal: Yes or No) ANOVA on the importance ratings. This test yielded no significant interaction or main effects (*F*s(1) < 1, n.s.).

2.3.2 Self-Conscious Emotions

The items for self-conscious emotions, positive emotions, and negative emotions showed satisfactory internal consistency (Cronbach's αs .82 - .87), so items within each category were averaged to compute composite emotional measures. T-tests on the three emotion scales showed no differences between participants in the GOD and HAT conditions (*t*s(58) < 1, n.s.). Follow-up tests on individual emotions revealed no significant differences for any of the 30 emotions measured (*t*s(58) < 1.8, n.s.). In addition, no significant differences were found on any of the four GASP subscales (*t*s(58) < 1.3, n.s.).

2.3.3 Action/Inaction Framing

Participants rated their own regrets as either action or inaction. However, I also independently coded each regret as either a regret of action or of inaction while blind to condition and to participants' action/inaction judgment. My coding matched participants' judgments in 45 out of 60 cases (75.0%). Of those cases where my coding different from participants' judgments, nine (60%) were rated by me as action but by participants as inaction and six (40%) were rated by me as inaction but by participants as action. Among participants, 61.7% judged their regrets to be inactions ("Something I wish I DID do") and 38.3% judged their regrets to be actions ("Something I wish I did NOT do"). I rated 56.7% of regrets as inactions and 43.3% of regrets as actions.

I analyzed both participants' action/inaction judgments and my ratings independently with Pearson's chi-squared tests. Participants' action/inaction judgments were not significantly affected by condition, $\chi^2(1, N=60) = .12$, n.s.. However, analysis of my coding revealed a marginally significant effect of priming, $\chi^2(1, N=60) = 2.99$, $p = .08$, such that participants in the GOD condition were more likely to report action regrets (55.6% of participants) compared to participants in the HAT condition (33.3%).

To test whether priming influenced the perceived importance of action and inaction regrets, I performed 2 (Condition: HAT or GOD) x 2 (Regret: Action or Inaction) ANOVAs using both participants' action/inaction judgments and my action coding. Analysis using participants' ratings revealed no interaction or main effects (Fs(1) < 1.7, n.s.). However, analysis using my action codes revealed a main effect of regret action ($F(1) = 5.02$, $p = .03$). A follow-up test revealed that inaction regrets were rated as more important (M = 4.00) than action regrets (M = 3.46), $t(58) = 2.58$, $p = .04$.

2.3.4 Moral Regrets

Participants' answers to the three morality questions (Moral Nature, Harm, and Help) were analyzed with Pearson's chi-squared test. Participants in the HAT condition were marginally more likely to report that their regret was of a moral nature (51.5%) compared to participants in the GOD condition (29.6%), $\chi^2(1) = 2.93$, $p = .09$. However, no differences were found for either the Harm or Help questions (χ^2s(1) < 2.2, n.s.)

To test whether priming influenced the perceived importance of moral and amoral regrets, I performed a 2 (Condition: GOD or HAT) x 2 (Moral Nature: Yes or No) ANOVA on the importance ratings. This test yielded no significant interaction or main effects (*F*s(1) < 1.4, n.s.).

To test whether an action/omission bias was found in our sample (i.e., whether participants were more likely to judge action than inaction regrets as moral), I performed chi-square tests on the Moral Nature question using both participants' action/inaction judgments and my action codes. Both tests revealed no relationship between moral judgments and action or inaction regrets (χ^2s(1) < 1, n.s.).

2.4 Discussion

This study was designed to test four hypotheses regarding the effects of religious priming: that religious priming increases (1) accessibility of interpersonal regrets, (2) self-consciousness, (3) recalled action regrets, and (4) accessibility of moral regrets. Although hypothesis (3) received marginal support from one of two tests, analyses testing hypotheses (1) and (4) showed marginal effects in the *opposite* of the predicted direction and there was no difference between conditions on tests related to hypothesis (2). Overall, there were no significant effects found in any of the analyses.

While this might lead one to conclude that the results from Study 1 refute the hypotheses, some methodological shortcomings may have made finding the hypothesized effects, if they exist at all, unlikely. First, the subliminal priming procedure may be too subtle to produce large effects on emotions and recalled regrets. Second, participants recalled their regrets *after* the subliminal priming procedure concluded and the survey had been loaded. They were not aware before the priming procedure that they would be asked to report regrets. Thus, participants did not have in mind a goal to recall a regret while they were being primed. Previous research has suggested that the motivation to pursue a goal is an important factor in effective subliminal priming (Strahan, Spencer, & Zanna, 2002). Finally, asking each participant to recall only one regret limited the measurement of many of the dependent variables to dichotomous outcomes. Asking participants to list more than one regret would provide more reliable measures. A study correcting these deficits would be more likely to detect the proposed effects, if they exist.

CHAPTER 3

STUDY 2

3.1 Overview

In Study 1, participants' emotions, regret content, and regret structure were largely unaffected by a subliminal priming manipulation that exposed them to the word *GOD* or the word *HAT*. However, because of methodological limitations, drawing inferences about the hypothesized effects proved difficult. The second study addressed the methodological limitations of Study 1 in three ways.

First, Study 2 made use of a stronger priming procedure. Participants in this study first completed a "handwriting analysis task," during which they copied sentences and wrote a brief essay. For half of the participants, some of the sentences and the essay contained a watchful God theme; for the remaining participants, no such theme was present. Participants then completed a "cognitive focusing task," during which they were subliminally primed with either the word *GOD* or the word *SOP*.

Second, participants were informed ahead of the subliminal priming procedure that they would be asked to recall regrets at three intervals *during* the cognitive focusing task. Thus, they entered the priming procedure with the goal to recall regrets, and there was minimal time elapsed between the subliminal priming and the recall of regrets.

Finally, participants in Study 2 were asked to recall three regrets each, enhancing the reliability of our measurements of regret structure and content. Based on these improvements, I expected to find better evidence regarding the four hypotheses.

3.2 Method

3.2.1 Participants

Eighty-eight undergraduates (44 women, 44 men, M_{age} = 20) participated in the study for partial course credit in an introductory psychology course during the spring. Participants were not prescreened for any conditions other than being at least 18 years old.

3.2.2 Procedure

Each participant was seated at a computer in a private experiment room and asked to read and complete an informed consent form. After consenting, participants were informed by a research assistant that the study aimed to discover the relationship between emotional experiences and several kinds of individual differences.

They were then given an envelope containing a handwriting packet and informed that they should take their time and complete the packet carefully in their best handwriting. Handwriting packets had been assembled and randomly assigned to participant numbers in advance by myself. Packet condition was obscured from research assistants by being stored in envelopes indicating only participant numbers and by indistinguishable cover sheets should the participants open the envelopes in the research assistants' presence. Participants were instructed to return the packets to the envelopes before informing the experimenter that they had completed the handwriting task.

The handwriting task (see Appendix C) consisted of a packet with two parts. In the first part, participants were asked to copy seven sentences (based in part on Shariff & Norenzayan, 2007). For half of participants, two of these sentences ("God is always watching" and "He sees everything") included a watchful God theme (God condition). For the other half of participants (Control condition), these sentences were replaced with religiously neutral sentences ("Whistle this song" and "Drive on the road").

In the second part, participants were asked to write at least half a page in response to an

essay prompt. Participants in the God condition were asked to write about what God knows (including what God pays attention to and how He knows things), and participants in the Control condition were asked to write about what a favorite professor knows (including what the professor pays attention to and how s/he knows things). Participants in the God condition who did not believe in God were instructed to write about what they think other people believe about God. These prompts were chosen because, whereas God is concerned with social knowledge (human behaviors and transgressions), professors are concerned with factual knowledge (the things that they teach). Thus, the God condition was intended to prime a sense of being watched that would be absent in the Control condition.

After completing the handwriting task, participants were informed by the experimenter that they would now be asked to recall regrets. They were told that in order to facilitate their concentration, they would complete a "cognitive focusing task" on the computer. Instructions for this task indicated that it was intended to help them eliminate distractions and concentrate on their regrets. At three points during the task, participants were asked to think back to events from their lives that they regretted and informed that they would be asked to report these regrets after the cognitive focusing task had concluded. Participants were told to begin the cognitive focusing task and allowed to complete the remainder of the study at a self-directed pace.

Instructions for the cognitive focusing task asked participants to focus on the center of the screen and press a key when one of three target words, "FOCUS," "LEFT," or "RIGHT," appeared. This task was actually 30 trials of a subliminal priming procedure. Each trial consisted of a focal point (+; 2000 ms), followed by a pre-mask (%%%%%; 5 ms), prime word (GOD or SOP; 15 ms), and target word (FOCUS, LEFT, RIGHT; until key pressed). After 10, 20, and 30 trials, participants were asked to recall a different regret, which they would record later.

After they completed the cognitive focusing task, participants were automatically directed by the computer to the regret questionnaire. Because participants were asked to recall their regrets during the subliminal priming procedure, the regret questionnaire began by asking them to write down all three of the regrets that they had previously recalled. They were then asked several questions about each regret. The questions were the same as in Study 1 (see Section 2.2.2.2) with the addition of one question: "How regretful do you feel about this event?" This question was added to get a measure of self-conscious emotion *while participants were thinking about their regrets* in addition to the self-conscious emotional states reported later. Because participants reported all of their regrets before answering the follow-up questions, each regret was printed on the screen while participants were answering the relevant questions to remind them of what they wrote.

After answering questions about their regrets, participants were asked about their current emotions. The emotions questionnaire was modified from Study 1 to include 32 emotions (see Appendix B) from the categories of self-conscious emotions, positive emotions, and negative emotions. The lists were based on Kedia and Hilton's (2011) list of self-conscious emotions and on the PANAS subscales for positive emotions, negative emotions, hostility, and guilt (Watson & Clark, 1994). Emotions were presented in two randomly ordered blocks (with emotions within each block randomly ordered). Instructions asked participants to "Indicate to what extent you feel this way *right now*" on a seven-point scale (1 = *not at all*; 7 = *extremely*).

Participants then completed the GASP scale and religiosity measure used in Study 2. At the end of the survey, they completed a demographics questionnaire, which included questions about age, gender, ethnicity, religious affiliation, education, and household income. At the end of the study, participants were asked about their suspicions regarding the priming procedure and

hypotheses and then debriefed about the purpose of the study and the nature of the priming procedure.

3.3 Results

Data from one participant was excluded due to a mismatch between priming conditions in the handwriting and cognitive focusing tasks. This left data from 44 and 43 participants in the God and Control conditions, respectively, to be analyzed.

3.3.1 Interpersonal Regrets

I coded each regret's content as in Study 1 (see Section 2.3.4). I rated 32.2% of regrets as related to the interpersonal domain and 67.8% of regrets as unrelated to the interpersonal domain. I created a composite score for the interpersonal coding by summing the number of regrets for each participant given the interpersonal code. A t-test on this composite measure revealed a significant effect for condition ($t(85) = -2.38$, $p = .02$). Whereas participants in the Control condition reported on average .74 (SD = .77) interpersonal regrets, participants in the God condition reported on average 1.20 (SD = 1.02) interpersonal regrets (see Figure 1, Section 3.5).

3.3.2 Self-Conscious Emotions

As in Study 1, the three sets of emotions showed satisfactory internal consistencies (Cronbach's αs .88 - .93), so the ratings of emotions in each category were averaged to create composite scores for self-conscious emotions, positive emotions, and negative emotions. T-tests on the three emotion scales revealed no significant differences between conditions ($ts(85) < 1$, n.s.). Follow-up t-tests on individual emotions likewise failed to find significant differences between conditions ($ts(85) < 1.8$, n.s.).

Participants' ratings of their regretfulness for individual regrets showed low internal

consistency (Cronbach's α = .56). Thus, they were analyzed separately. T-tests on the individual regretfulness ratings showed no differences between conditions (*t*s(85) < 1.8, n.s.).

No significant differences were found on any of the four GASP subscales (*t*s(85) < 1, n.s.).

3.3.3 Action/Inaction Regrets

I coded participants' regrets as actions and inactions as in Study 1 (see Section 2.3.2). My coding matched participants' action/inaction judgments for 212 out of 261 cases (81.2%). Of those cases where my coding differed from participants' judgments, 29 (59.2%) were rated by me as action but by participants as inaction and 20 (40.8%) were rated by me as inaction but by participants as action. Participants judged 53.6% of their regrets to be inactions ("Something I wish I DID do") and 46.4% of their regrets to be actions ("Something I wish I did NOT do"). I rated 50.2% of regrets as inactions and 49.8% of regrets as actions.

I independently summed participants' action judgments and my action codes (where 0 = inaction and 1 = action) to create composite scores of number of action regrets recalled. A t-test on the sum of participants' action/inaction judgments revealed no significant effect for condition (*t*(85) = .24, n.s.). A t-test of on the sum of my action/inaction codes also yielded no significant effect for condition (*t*(85) = -.11, n.s.).

To test whether priming influenced the perceived importance of and amount of regret felt for action and inaction regrets, I performed 2 (Condition: HAT or GOD) x 2 (Regret: Action or Inaction) ANOVAs using both participants' action/inaction judgments and my action coding. Analysis using participants' ratings revealed no interaction or main effects (*F*s(1) < 1.7, n.s.). However, analysis using my action codes revealed a main effect of regret action (*F*(1) = 5.02, p = .03). A follow-up test revealed that inaction regrets were rated as more important (M = 4.00)

than action regrets (M = 3.46), $t(58) = 2.58$, $p = .04$.

3.3.4 Moral Regrets

Composite scores for each of the three morality items (Moral Nature, Harm, and Help) for each participant were created by summing the number of affirmative answers to each question. T-tests for the Moral Nature, Harm, and Help sums revealed no significant effects for condition ($ts(85) < 1.2$, n.s.).

3.4 Discussion

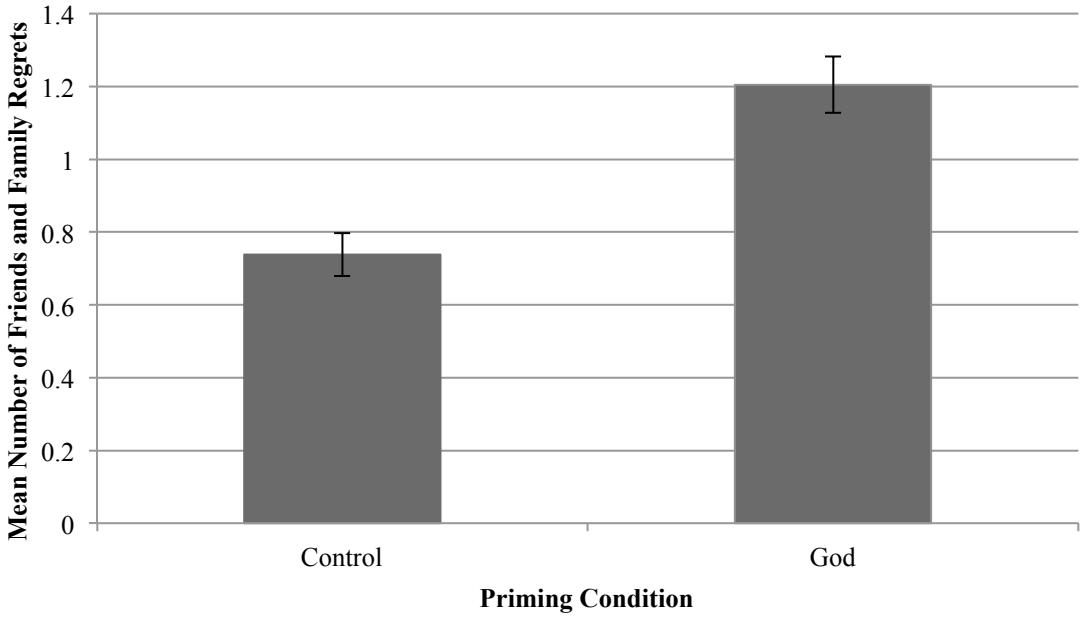
Study 2 investigated the same hypotheses as Study 1 but with an improved design, relying on a strong priming procedure, making participants aware of the regret recall instructions during the subliminal priming, and asking participants to recall three regrets instead of one. Study 2 did not replicate any of Study 1's marginally significant results (i.e., more interpersonal regrets in the control condition, more action regrets in the God condition, and more moral regrets in the control condition). In fact, while Study 1 obtained marginal results in the opposite direction of hypothesis (1) (i.e., *fewer* interpersonal regrets in the God condition), Study 2 found significant results in favor of hypothesis (1) (i.e., *more* interpersonal regrets in the God condition). Like Study 1, however, Study 2 failed to find significant evidence in favor of hypotheses (2), (3), and (4).

Given these inconsistent results, it is difficult to draw conclusions, especially regarding interpersonal regrets. Study 2's methodological improvements suggest that its results may be more reliable. However, there are still methodological improvements that can be made over Study 2's design, which used a small and potentially biased sample. A college student sample may distort the types of regrets recalled by participants. Morrison and Roese (2012) found that regrets from a nationally representative sample of adults had different distributions of both

structure and content when compared to an earlier meta-analysis of college student samples (Roese & Summerville, 2005). Relevant to the present hypotheses, regrets relating to both friends and family were substantially higher in the nationally representative sample than among college students, whose regrets focused (unsurprisingly) much more on education. Given that students have education on the mind, it is plausible that the increase of interpersonal regrets in Study 2's God condition is an artifact of *reduced educational regrets* in that condition. That is, due to the contrast between the educational prime (professor essay) in the Control condition and the non-educational primes in the God condition, participants in the Control condition may have recalled more educational regrets and therefore fewer regrets from other life domains, including interpersonal regrets. To investigate this potential alternative explanation, I coded participants' regrets (blind to condition) as either related to education (e.g., not studying enough or choosing the wrong college) or not related to education (e.g., having too much to drink or getting arrested). Overall, 23.3% of participants' regrets pertained to education. As with the interpersonal coding, I summed the total number of educational regrets recalled by each participant and performed a t-test by condition on these scores. No significant difference was found between the number of educational regrets reported by participants in the two conditions ($t(85) = .23$, n.s.). Thus, it is unlikely that the observed difference in friends and family regrets is an artifact of a difference in educational regrets. To shed further light on this issue, Studies 3a and 3b attempted to replicate the effect on interpersonal regrets in larger non-student samples.

3.5 Figures

Figure 1. Mean number of interpersonal regrets (0-3) by priming condition. Error bars represent standard errors.



CHAPTER 4

STUDIES 3A AND 3B

4.1 Overview

In Study 2, participants who were exposed to religious priming were more likely to recall interpersonal regrets when compared to participants who exposed to religiously neutral primes. Because the participants in Study 2 were undergraduate students, Studies 3a and 3b sought to replicate this result in a more representative sample of American adults, recruited via Amazon's Mechanical Turk service.

The use of an older and more diverse sample has several advantages in studying the effects of religious priming on regret recall. First, as discussed in Section 3.4, undergraduate students' regrets tend to focus disproportionately on education when compared against a representative sample of American adults (Morrison & Roese, 2012). Thus, the recall of non-educational regrets may be distorted in the younger sample. Second, Morrison and Roese (2012) failed to replicate the "action effect," whereby action regrets are more frequent or more important than inaction regrets, in their nationally representative sample. Thus, null findings on action regrets in Studies 1 and 2 may plausibly be due to a ceiling effect on action regrets (i.e., that undergraduates are already biased towards action regrets, leaving little room for an increase due to priming). Third, being relatively young and therefore having fewer experiences, college students may simply have fewer and less important regrets than older adults who have had more opportunities to both accrue regrets and reflect on them. For example, although some of the regrets listed in Studies 1 and 2 are clearly important (e.g., missed opportunities to reconnect with loved ones before they passed away), many seem much less important (e.g., having a bad

haircut in high school). The regrets recalled by a more representative sample may simply be more interesting objects of study.

Apart from the sampling population, Studies 3a and 3b differ from Study 2 in three ways. First, the priming procedure was altered. To avoid priming a regret content domain in the control condition, I chose *not* to prime participants in this condition. Participants in the control conditions of Studies 3a and 3b began with the regret recall procedure. In addition, the online data collection format used in Studies 3a and 3b made the handwriting sample and subliminal priming procedure unattractive as methodological tools. Thus, participants in the God condition were simply asked to answer the essay prompt from the handwriting task used in Study 2 on the computer and not asked to copy sentences. Second, several questions were added and removed from the regrets questionnaire. Namely, more emotions questions were added and the previous questions about morality replaced with a simpler question. Finally, the GASP scale was dropped because it is designed to assess trait-based guilt and shame and may simply be insensitive to the effects of the priming.

Study 3a produced a marginally significant replication of the effect on interpersonal regrets found in Study 2. Thus, Study 3b was conducted as a second replication attempt. Studies 3a and 3b differed only in that Study 3b also asked participants to list three accomplishments at the end of the study. This procedure was added after finding that the regrets listed in Study 3a were indeed more severe in content than those given in Studies 1 and 2. I felt it was important to allow participants to reflect on positive experiences to return them to a better state at the conclusion of the study.

4.2 Method

4.2.1 Participants

4.2.1.1 Study 3a

Two hundred forty-four (162 women, 81 men, 1 not reporting gender, M_{age} = 33) responded to an ad on Amazon's Mechanical Turk service to complete a brief psychological study in exchange for $0.75. The ad specified that participants must be at least 18 years old, reside in the US, and have at least a 60% job approval rate on Mechanical Turk.

4.2.1.2 Study 3b

Two hundred four (128 women, 74 men, 2 not reporting gender, M_{age} = 33) responded to a second identical ad on Mechanical Turk. Participants were paid $0.75.

4.2.2 Procedure

Participants who accepted the job on Mechanical Turk were directed to a survey hosted on the Qualtrics survey website. There, they were randomly assigned to either the God Prime or No Prime condition. Participants assigned to the God condition were asked to respond to the same essay prompt given in the handwriting packet of the God in Study 2 (see Appendix C). Participants were told that the essay question was a measure of verbal ability and was selected from a bank questions "designed to inspire deep thinking about important issues." To ensure that exposure to the prompt was roughly equivalent across participants, the instructions asked them spend three minutes answering the prompt. The survey software was programmed to display the page for three minutes and then automatically forward to the regrets questionnaire. Participants in the No Prime condition proceeded directly to the regret questionnaire.

The regret questionnaire began by instructing participants to recall and record, one at a time, three regrets from their past. Then, participants were asked several questions about each regret. The questions were the same as in Study 2 with the following exceptions. In addition to rating how regretful they were about each regret, participants also rated how ashamed,

embarrassed, and guilty they felt about each event on seven-point scales (1 = *not at all [ashamed/embarrassed/guilty]*; 7 = *very [ashamed/embarrassed/guilty]*). Further, the three morality questions used in Studies 1 and 2 were replaced with a single simpler question, asking participants, "Do you think that your behavior was morally wrong?" and answered in a yes/no format.

After recording their regrets and answering questions about them, participants completed the emotions questionnaire. The emotions questionnaire used in Studies 3a and 3b asked participants to rate how much they were experiencing each of 26 emotions right now on seven-point scales (1 = *not at all*; 7 = *extremely*; see Appendix B for the full list of emotions). The emotions were presented on five pages, with self-conscious emotions presented first, followed by negative emotions and then positive emotions. The lists were based on Kedia and Hilton's (2011) list of self-conscious emotions and on the PANAS subscales for positive emotions, negative emotions, and guilt (Watson & Clark, 1994).

Next participants completed the same measure of religiosity used in Studies 1 and 2. Participants in Study 3b were then asked to recall three "important accomplishments in your life that you are proud of." Participants in both Studies 3a and 3b completed a demographics questionnaire that included questions about gender, age, race, religious affiliation, education, and income. Participants were asked about their suspicions regarding the priming procedure (only if they were in the God Prime condition) and hypotheses before being debriefed.

4.3 Results

4.3.1 Study 3a

Qualtrics recorded five participants as having non-US IP addresses. Data from these participants were excluded due to not meeting pre-screening conditions. Eight further cases were

excluded due to repeated IP addresses (indicating the possibility of repeat participants). Data from 14 participants were excluded due to listing fewer than three usable regrets (e.g., stating that s/he has no regrets, listing a regret that was not about his or her own behavior, or listing an unintelligible regret). This left data from 101 and 116 participants in the No Prime and God Prime conditions, respectively.

4.3.1.1 Interpersonal Regrets

I coded each regret's content as in Study 1 (see Section 2.3.4). I rated 24.1% of regrets as related to and 75.9% of regrets as unrelated to the interpersonal domain. I created a composite score for the coding by summing the number of regrets for each participant that were coded as related to the interpersonal domain. A t-test on the total number of interpersonal regrets revealed a marginally significant effect for condition ($t(215) = -1.77$, $p = .08$). Whereas participants in the Control condition reported on average .62 (SD = .77) interpersonal regrets, participants in the God condition reported on average .81 (SD = 1.02) interpersonal regrets (see Figure 1, Section 3.5).

4.3.1.2 Self-Conscious Emotions

As in Studies 1 and 2, the three sets of emotions showed satisfactory internal consistency (Cronbach's αs .92 - .96), so the ratings of emotions in each category were averaged to create composite scores for self-conscious emotions, positive emotions, and negative emotions. T-tests on the three emotion scales revealed no significant differences between conditions (ts$(215) < 1.6$, n.s.). Follow-up t-tests on individual emotions revealed a significant difference between conditions only for *strong* ($t(215) = 2.34$, $p = .02$) such that participants in the No Prime condition (M = 3.92, SD = 1.81) felt slightly stronger than participants in the God Prime condition (M = 3.36, SD = 1.70). However, given the large number of comparisons (26) involved

and a lack of a priori justification for this finding, it is most likely due to chance.

Participants' ratings of the four self-conscious emotions (*regretful*, *ashamed*, *embarrassed*, and *guilty*) for all three regrets showed good internal consistency (Cronbach's α = .87). These items were averaged to form a composite score, which I subjected to a t-test by condition. No significant difference was found ($t(215) = -.83$, n.s.).

4.3.1.3 Action/Inaction Regrets

I coded participants' regrets as actions and inactions as in Study 1 (see Section 2.3.2). My coding matched participants' action/inaction judgments for 520 out of 651 cases (79.9%). Of those cases where my coding differed from participants' judgments, 82 (62.6%) were rated by me as action but by participants as inaction and 49 (37.4%) were rated by me as inaction but by participants as action. Participants judged 51.5% of their regrets to be inactions ("Something I wish I DID do") and 48.5% of their regrets to be actions ("Something I wish I did NOT do"). I rated 46.1% of regrets as inactions and 53.6% of regrets as actions.

I independently summed participants' action judgments and my action codes (where 0 = inaction and 1 = action) to create composite scores of number of action regrets recalled. A t-test on the sum of participants' action/inaction judgments revealed no significant effect for condition ($t(215) = .28$, n.s.). A t-test of on the sum of my action/inaction codes also yielded so significant effect for condition ($t(215) = 1.19$, n.s.).

4.3.1.4 Moral Regrets

A composite score for the morality item was created by summing the number of affirmative answers for each participant. TA t-test on the number of morally wrong regrets recalled revealed no significant effects for condition (ts$(215) < 1.22$, n.s.).

4.3.2 Study 3b

Qualtrics recorded five participants as having non-US IP addresses. Data from these participants were excluded due to not meeting pre-screening conditions. Data from 17 participants were excluded due to listing fewer than three usable regrets (e.g., stating that s/he has no regrets, listing a regret that was not about his or her own behavior, or listing an unintelligible regret). This left data from 89 and 93 participants in the No Prime and God Prime conditions, respectively.

4.3.2.1 Interpersonal Regrets

I coded each regret's content as in Study 1 (see Section 2.3.4). I rated 25.6% of regrets as interpersonal and 74.4% of regrets as not interpersonal. I created a composite score for the interpersonal coding by summing the number of regrets for each participant that were coded as interpersonal. A t-test on the total number of interpersonal regrets revealed no significant effect for condition ($t(180) = .01$, n.s.).

4.3.2.2 Self-Conscious Emotions

The three sets of emotions showed satisfactory internal consistencies (Cronbach's αs .90 - .96), so the ratings of emotions in each category were averaged to create composite scores for self-conscious emotions, positive emotions, and negative emotions. Unlike in previous studies, a marginally significant effect of condition was found on self-conscious emotions ($t(180) = -1.71$, $p = .09$). Participants in the God Prime condition ($M = 3.83$, $SD = 1.69$) expressed more self-conscious emotions compared to participants in the No Prime condition ($M = 3.40$, $SD = 1.68$). However, a similar marginally significant effect was also found on non-self-conscious negative emotions ($t(180) = -1.83$, $p = .07$), with participants in the God Condition ($M = 2.81$, $SD = 1.42$) expressing more negative emotion than participants in the No Prime ($M = 2.42$, $SD = 1.47$) condition. Condition had an opposite and marginally significant effect on positive emotions

($t(180) = 1.98$, $p = .05$), such that participants in the God Prime ($M = 3.62$, $SD = 1.14$) condition expressed less positive emotion that participants in the No Prime condition ($M = 3.96$, $SD = 1.13$). Thus, although participants in the God Condition may have experienced more self-conscious emotion, they also felt more negative and less positive overall than participants in the No Prime condition.

Participants' ratings of the four self-conscious emotions (*regretful*, *ashamed*, *embarrassed*, and *guilty*) for all three regrets showed good internal consistency when (Cronbach's $\alpha = .88$). These items were averaged to form a composite score, which I subjected to a t-test by condition. No significant difference was found ($t(180) = .00$, n.s.).

4.3.2.3 Action/Inaction Regrets

I coded participants' regrets as actions and inactions as in Study 1 (see Section 2.3.2). My coding matched participants' action/inaction judgments for 451 out of 546 cases (82.6%). Of those cases where my coding differed from participants' judgments, 54 (56.8%) were rated by me as action but by participants as inaction and 41 (43.2%) were rated by me as inaction but by participants as action. Participants judged 46.7% of their regrets to be inactions ("Something I wish I DID do") and 53.3% of their regrets to be actions ("Something I wish I did NOT do"). I rated 44.3% of regrets as inactions and 55.7% of regrets as actions.

I independently summed participants' action judgments and my action codes (where 0 = inaction and 1 = action) to create composite scores of number of action regrets recalled. A t-test on the sum of participants' action/inaction judgments revealed no significant effect for condition ($t(180) = -.20$, n.s.). A t-test of on the sum of my action/inaction codes also yielded so significant effect for condition ($t(180) = 1.15$, n.s.).

4.3.2.4 Moral Regrets

A composite score for the morality item was created by summing the number of affirmative answers for each participant. A t-test on the number of morally wrong regrets revealed a marginally significant effect for condition ($t(180) < 1.72$, $p = .09$).

4.4 Discussion

Studies 3a and 3b improved upon Studies 1 and 2 by using older and more representative samples. Thus, the regret data analyzed are probably more representative of the typical regrets of American adults.

These studies attempted to replicate the positive effect of God priming on recall of interpersonal regrets found in Study 2. Although Study 3a found a marginally significant effect on interpersonal regrets, Study 3b showed no such effect. No significant effect was found on action and inaction regrets nor on moral regrets. Although Study 3b found a marginally significant effect in the predicted direction on self-conscious emotions, that effect is qualified by the facts that (1) participants in the God Condition simply felt worse overall and (2) no such effect was found with identical procedures in study 3a. From the evidence in Studies 3a and 3b it is not possible to conclude the religious priming has any effect on self-conscious emotions or on the structure or content of recalled regrets.

CHAPTER 5

META-ANALYSIS

5.1 Overview

In four studies, I used semantic priming to activate the concept of *God* and then asked participants to recall regrets and report their emotions. These studies were designed to test four hypotheses: that participants exposed to the God prime, compared to those in a control condition, would (1) recall a higher proportion of interpersonal regrets, (2) feel more self-conscious emotions, (3) frame their regrets as actions rather than inactions, and (4) be more likely judge their past behavior as immoral. Although these hypotheses were derived from extant theories in the psychology of religion and on previous findings relating action regrets to self-conscious emotions and moral judgment, no consistent evidence was found to support any of the predictions.

However, failure to find a pattern of *significant* findings does not necessarily indicate that there are no effects of the dependent variables. Many psychologists have suggested that relying on null hypothesis significance testing may obscure meaningful discoveries (e.g., Wagenmakers, 2007). This criticism is especially important to consider when either effects or samples are small. Insufficiently sized samples are a pervasive problem in the psychological literature (Bakker, van Dijk, & Wicherts, 2012; Cohen, 1990). Samples of even 100 participants per condition may not be sufficient to reliably find modestly-sized effects with a Student's t-test; yet, the typical sample size for such comparisons in psychology journals is much closer to 20 per condition (Marszalek, Barber, Kohlhart, & Cooper, 2011), sufficient to reliably find effects larger than $d = .90$ (with power of .80). A power analysis on Study 3a (which has just over 100 participants in each condition) suggests it would reliably find effects of $d = .38$ or larger. For comparison, Cohen

(1992) describes and effect of $d = .50$ as "an effect likely to be visible to the naked eye of a careful observer" (p. 156). Study 1 (with about 30 participants per condition) has sufficient power to detect effect sizes of $d = .74$ or larger, near Cohen's (1992) criterion for large effects ($d = .80$).

Is it reasonable to expect semantic priming effects to be as large as $d = .74$ or even $d = .38$? If they were as large as $d = .74$, the effects should be obvious to most people, and our thoughts and behavior would be strongly influenced my whatever we read most recently. Measurement would hardly be necessary to notice this influence. An effect size of $d = .38$ is more likely, but is it a realistic estimate of priming effects? Of course, not all priming effects will be equal. Some priming methods may have bigger effects than others, and the same priming manipulation may have larger or smaller effects on different dependent variables. So a better question is whether $d = .38$-$.74$ is a reasonable size for the effects of the manipulations and dependent measures investigated in the studies reported here and, by extension, whether 100 participants per condition is sufficient to reliably find the effects of interest. To answer these questions, I meta-analyzed the effects for hypotheses (1)-(4) in the four studies reported here.

5.2 Method

To be included in the meta-analyses, hypothesis tests had to produce congruent effect sizes. For this reason, I elected to include only tests from which Cohen's *d* (the standardized difference between means) can be can be calculated. Thus, I excluded several responses from Study 1 with dichotomous outcomes (i.e., data for action/inaction, morality, and interpersonal regrets).

I first calculated the effect sizes (Cohen's *d*) for each hypothesis in each study. For Hypothesis (1), that religious priming would increase the proportion of interpersonal regrets, I

omitted the dichotomous outcome from Study 1. I included the effect size calculated for the number of regrets coded as interpersonal from Studies 2 through 3b in this analysis.

For Hypothesis (2), that religious priming would increase self-conscious emotions, I computed *d* for the self-conscious subset of the emotions questionnaire in Studies 1 through 3b. I also separately computed an effect size for the self-conscious emotions in the regrets questionnaire in Studies 3a and 3b. Thus, six effect sizes were included in the meta-analysis of Hypothesis (2).

For Hypothesis (3), that religious priming would increase the proportion of action regrets, I chose to use my own rather than participants' coding in calculating *d*. Action codes from Studies 2 through 3b only are represented in the meta-analysis for Hypothesis (3). Participants in Study 1 reported only one regret, so the dependent variable (action/inaction) was dichotomous and does not yield an effect size estimate comparable to *d*.

Likewise, the meta-analysis of Hypothesis (4), that religious priming would increase the proportion of moral regrets, uses only data from the last three studies and omits the dichotomous outcomes in Study 1. For this analysis, I used only the questions that asked directly about moral judgment, "Do you think that the actions that brought on this regret are of a moral nature?" in Study 2 and "Do you think that your behavior was morally wrong?" in Studies 3a and 3b. I opted not to use the *Harm* or *Help* questions because their relationship to moral judgment is more ambiguous.

I chose a fixed-effects meta-analytic procedure because my goal in this meta-analysis was to estimate the sizes of effects *within* the four studies reported here and *not* to generalize to situations, populations, or operationalizations outside of these studies (Hedges, & Vevea, 1998). I used Hedges and Vevea's (1998) method for fixed-effects meta-analysis as implemented in SPSS

by Field and Gillet (2010).

5.3 Results

The effect size estimate for Hypothesis (4) (interpersonal regrets) reached significance, with $d^+ = .20$ in the hypothesized direction ($z = 2.20$, p = .03; see Table 2), a small effect, according to Cohen (1992). However, the 95% confidence interval around this estimate is wide ($CI_{95} = .20 \pm .18$), so the real effect may be substantially larger or smaller. Post-hoc power analyses reveal that Studies 2, 3a, and 3b had power of only .15, .31, and .27 to detect an effect of $d = .20$. That is, 69%-85% of the time, studies with the same sample sizes would have failed to reject the null hypothesis, even though there may be a true effect. In order to reliably detect an effect of this size (power of .80), a sample size of $n = 394$ subjects per condition is needed.

Meta-analyses for Hypotheses (2) through (4) revealed non-significant effect size estimates of $d^+ < .1$ (zs < 1.4, n.s.).

5.4 Discussion

The meta-analyses of the hypotheses for Studies 1 through 3b suggest that religious priming has a small effect on recalled interpersonal regrets and no effect on self-conscious emotions, recalled action regrets, or recalled moral regrets.

Given the findings from the meta-analyses and power analyses, it is not surprising that the four studies failed to provide a consistent pattern of results. Not only were the samples under-powered to detect the small effects that ought to be expected of priming, they were too small to provide reliable point estimates for the means (note the wide 95% confidence intervals in Table 2), making false positives more likely when relying on $p < .05$ as the sole criterion for judging effects.

Fortunately, the meta-analyses take advantage of the full power of all of the data

collected and allow clearer conclusions to be drawn than the studies. Namely, although religious priming does not appear to affect the experience of self-conscious emotions, action regret recall, or moral regret recall, it does appear to influence the recall of interpersonal regrets.

5.5 Tables

Table 1. Effect sizes (Cohen's *d*) for Hypotheses (1) through (4) in Studies 1 through 3b.

Hypo-		Control			God					
thesis	Study	M	SD	n	M	SD	n	*t*	*p*	*d*
(1)	2	0.72	0.77	43	1.20	1.02	44	2.49	0.02	0.53
(1)	3a	0.62	0.76	101	0.81	0.79	116	1.77	0.08	0.24
(1)	3b	0.76	0.71	89	0.76	0.86	93	-0.01	1.00	0.00
(2)	1[a]	1.94	1.01	33	2.07	0.91	27	0.54	0.59	0.14
(2)	2[a]	3.31	1.61	43	3.38	1.44	44	0.24	0.81	0.05
(2)	3a[b]	3.56	1.85	101	3.54	1.72	116	-0.08	0.94	-0.01
(2)	3a[a]	4.38	1.34	101	4.53	1.29	116	0.84	0.40	0.11
(2)	3b[b]	3.40	1.68	89	3.83	1.69	93	1.71	0.09	0.25
(2)	3b[a]	4.47	1.20	89	4.47	1.34	93	0.00	1.00	0.00
(3)	2	1.58	1.12	43	1.61	1.66	44	0.11	0.92	0.02
(3)	3a	1.67	1.01	101	1.63	1.28	116	-0.28	0.78	-0.04
(3)	3b	1.75	0.92	89	1.59	0.97	93	-1.15	0.25	-0.17

Note: Hypotheses are as follows: Religious priming will increase (1) the proportion of interpersonal regrets, (2) self-conscious emotions, (3) the proportion of recalled regrets framed as actions, and (4) the proportion of regrets judged to be moral.

[a]Self-conscious emotions from emotion questionnaire

[b]Self-conscious emotions from regret questionnaire

Table 1 (cont.œ)

Hypo-		Control			God					
thesis	Study	M	SD	n	M	SD	n	*t*	*p*	*d*
(4)	2	1.05	1.07	43	1.27	1.04	44	1.00	0.32	0.21
(4)	3a	0.70	0.83	101	0.69	0.77	116	-0.12	0.90	-0.02
(4)	3b	0.82	0.87	89	0.61	0.75	93	-1.72	0.09	-0.25

Table 2. Meta-analytic estimates of effect sizes for Hypotheses (1) through (4).

Hypothesis	*k*	d^+	95% CI for d^+		SE	*z*	*p*
			LL	*UL*			
(1) Interpersonal	3	0.20	0.02	0.38	0.09	2.20	0.03
(2) Self-conscious emotions	6	0.09	-0.04	0.21	0.07	1.32	0.19
(3) Action/inaction	3	-0.08	-0.26	0.10	0.09	0.84	0.40
(4) Moral	3	-0.06	-0.24	0.11	0.09	0.71	0.48

Note: *k* = no. effect sizes in meta-analysis; d^+ = averaged corrected standardized difference effect size; 95% CI = 95% confidence intervals; *LL* = lower limit of confidence interval; *UL* = upper limit of confidence interval; *SE* = standard error of d^+; *z* = Fisher's *z*

CHAPTER 6

GENERAL DISCUSSION

In four studies and a meta-analysis, I examined the effects of religious priming in the context of regret recall. Hypothesis one (interpersonal regrets) shows the most promise among the studies: the only significant hypothesized finding among the studies was for increased interpersonal regrets in the God condition of Study 2. Study 3a showed a marginal effect in the same direction. Despite not being replicated in Study 3b, this effect emerged as significant in the meta-analysis, with an effect size estimate of $d^{+} = .20$.

None of the studies nor the meta-analysis found any support the second hypothesis (self-conscious emotions), despite using three different methods for measuring self-conscious emotions (i.e., present emotional experiences, the GASP scale, and emotions felt for specific regrets). (Although study 3b found a marginally significant effect for self-conscious emotions, this effect was simply an artifact of participants in the God Prime condition feeling worse overall and was not replicated in any other sample.) Whereas Study 1 found marginal support for the third hypothesis (action regrets) on one of two measures of action regrets, this effect was not replicated in any of the other studies nor was it significant in the meta-analysis. Regarding the fourth hypothesis (moral regrets), four different measures were used to assess the moral nature of recalled regrets (i.e., the *Moral Nature*, *Harm*, *Help*, and *Morally Wrong* questions) across the four studies. Again, in Study 1, a marginally significant effect was found (in the opposite direction of the prediction) on just one of the three measures used in that study, and this effect was not replicated in any of the following studies nor was it found in the meta-analysis.

6.1 Limitations

Overall, there is evidence for only limited effects of religious priming on recalled regrets.

Although the meta-analyses provide a good summary of the research reported here, there are some limitation that should be considered before drawing conclusions from the findings.

6.1.1 Sample Size

All four Studies relied on what are probably inadequate sample sizes for priming research. If priming affects behavior, such effects are likely to be small and to reliably appear only in samples larger than the ones used in these studies. Larger sample sizes would also provide more precise estimates of the means and effect sizes measured.

6.1.2 Mismeasurement

With the exception of recall of interpersonal regrets (the only dependent variable for which any significant effect was found), I used multiple measures for each dependent variable across the four studies. I likewise used several different priming techniques. Thus, it is unlikely the failure to capture a reliable effect was due to reliance on a single invalid measure. However, the only previous findings regarding the effect of religious priming on self-consciousness used a cognitive measure (Gervais & Norenzayan, 2012). It is possible that using emotional measures of self-consciousness prevented me from replicating this effect. However, the relationship between such cognitive measures and regrets is much less clear than for the emotional measures and so the emotional measures were more appropriate in this context.

6.1.3 Failure to Manipulate Intended Construct

I did not include an explicit manipulation check measure (e.g., word completion, thought listing) to determine whether the priming actually made religious concepts, and especially, a watchful God more accessible. Thus, it is plausible that, especially in Study 1, the manipulations did not affect the intended construct. However, in Studies 2, 3a, and 3b, I do have access to the essays written by participants. From these essays, it is clear that, at least while writing the essays,

many participants did think about God as an agent with access to thoughts and concern for moral behavior. For example, a typical response, written by a participant in Study 3a, reads, in part, "God knows everythng. He knows how everyone feels and he knows their desires. He knows what everyone ambitions and talents are. He knows our most inner thoughts." It is difficult to believe that the participants who wrote such essays did not have ready access to concepts related to supernatural monitoring.

6.2 Future Research

Overall, it seems justified to at least tentatively accept the findings of the meta-analyses—namely, that religious priming increases recall of interpersonal regrets but does not affect self-conscious emotions, action/inaction regret recall, or moral regret recall. However, future research should attempt to replicate the findings regarding interpersonal regrets with a sufficient sample size (approximately 400 participants per condition). Further refinements of the experimental procedures can be made in at least two ways. First, activating the goal of regret recall prior to the priming procedure may increase the strength of the effect. This was done in Study 2, the only study to find a significant effect on interpersonal regret recall and the one that had by far the largest effect on this variable. Second, more information can be obtained from participants about what they perceive as the consequences of their regrets. It may be the case that participants primed with religious words will perceive more interpersonal consequences even for regrets in other domains. For example, they may be more likely to reflect on the ways that their educational failures affected their families (e.g., in the form of disappointing family members or harming them financially) rather than themselves (e.g., their own pride, career aspirations, or finances). A successful replication of this effect would strengthen the conclusion that religious priming affects recall of interpersonal regrets.

6.3 Conclusion

Although the studies reported as part of the present research were intended as extensions, rather than direct tests, of the supernatural punishment hypothesis, the failure to find the predicted effects for Hypotheses (2) through (4) is concerning. The proposed hypotheses were not wild derivations from the theories into totally new territory. Rather, they were grounded in empirical work on the effects of religious priming on current cognition and behavior, applying these findings to recollection of past behavior. If religious priming does increase our concern about appearing moral (e.g., Shariff & Norenzayan, 2007), why would this apply only to current behavior? Perhaps God doesn't care what you have done, only what you will do; religion is for preventing new transgressions, not for dwelling on past ones. While this explanation is plausible, the question of why religions place so much emphasis on reflecting on and atoning for past transgressions remains a puzzle. With respect to action regrets, one plausible explanation for a failure to find the hypothesized effect may be that action and inaction are not important in the context of mind-reading the recall of past behavior—the behavior is apparent to God when he is reading your mind, regardless of what form it took or how it is framed.

Overall, these studies provide little support for the supernatural punishment hypothesis: Religious priming does not appear to promote self-conscious emotions, accessibility of moral concerns, or concerns about actions rather than omissions. However, the binding account of religion as a social glue that brings people together into cohesive communities is supported by the effect of religious priming on increased recall of interpersonal regrets. Although the effect is small, it is consistent with the idea that religion makes people more concerned about their relationships with others and promotes self-regulation in the social domain.

REFERENCES

Bakker, M., van Dijk, A., & Wicherts, J. M. (2012). The Rules of the Game Called Psychological Science. *Perspectives on Psychological Science, 7*, 543–554. doi:10.1177/1745691612459060

Barrett, J. L. (2008). Why Santa Claus is not a god. *Journal of Cognition and Culture, 1*, 149–161. doi:10.1163/156770908X289251

Bering, J. M., & Johnson, D. D. P. (2005). "O Lord . . . You perceive my thoughts from afar": Recursiveness and the evolution of supernatural agency. *Journal of Cognition and Culture, 1*, 118–142. doi:10.1163/1568537054068679

Bering, J. M., McLeod, K., & Shackelford, T. K. (2005). Reasoning about dead agents reveals possible adaptive trends. *Human Nature, 16*, 360–381. doi:10.1007/s12110-005-1015-2

Cohen, J. (1990). Things I have learned (so far). *The American Psychologist, 45*, 1304–1312. doi:10.1037/0003-066X.45.12.1304

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155–159. doi:10.1037/0033-2909.112.1.155

Cohen, T. R., Wolf, S. T., Panter, A., & Insko, C. A. (2011). Introducing the GASP scale: A new measure of guilt and shame proneness. *Journal of Personality and Social Psychology, 100*, 947. doi:10.1037/a0022641

Cushman, F., Young, L., & Hauser, M. D. (2006). The role of conscious reasoning and intuition in moral judgment testing three principles of harm. *Psychological Science, 17*, 1082–1089.

Diener, E., Tay, L., & Myers, D. G. (2011). The religion paradox: If religion makes people happy, why are so many dropping out? *Journal of Personality and Social Psychology, 101*, 1278–1290. doi:10.1037/a0024402

Epstude, K., & Roese, N. J. (2008). The functional theory of counterfactual thinking. *Personality and Social Psychology Review, 12*, 168–192. doi:10.1177/1088868308316091

Field, A. P., & Gillett, R. (2010). How to do a meta-analysis. *British Journal of Mathematical and Statistical Psychology, 63*, 665–694. doi:10.1348/000711010X502733

Gervais, W. M., & Norenzayan, A. (2012). Like a camera in the sky? Thinking about God increases public self-awareness and socially desirable responding. *Journal of Experimental Social Psychology, 48*, 298–302. doi:10.1016/j.jesp.2011.09.006

Graham, J., & Haidt, J. (2010). Beyond beliefs: Religions bind individuals into moral communities. *Personality and Social Psychology Review, 14*, 140–150. doi:10.1177/1088868309353415

Hedges, L. V., & Vevea, J. L. (1998). Fixed-and random-effects models in meta-analysis. *Psychological Methods, 3*, 486-504. doi:10.1037/1082-989X.3.4.486

Johnson, D. D. P., & Bering, J. M. (2006). Hand of God, mind of man: Punishment and Cognition in the Evolution of Cooperation. *Evolutionary Psychology, 4*, 219–233.

Kedia, G., & Hilton, D. J. (2011). Hot as hell! The self-conscious nature of action regrets. *Journal of Experimental Social Psychology, 47*, 490–493. doi:10.1016/j.jesp.2010.10.017

Marszalek, J. M., Barber, C., Kohlhart, J., & Holmes, C. B. (2011). Sample size in psychological research over the past 30 years. *Perceptual and Motor Skills, 112*, 331–348. doi:10.2466/03.11.PMS.112.2.331-348

Morrison, M. R. S. (2012,). *Upward and onward: Direction of counterfactuals, future action, and well-being over time*. (Unpublished doctoral dissertation). University of Illinois at Urbana-Champaign.

Morrison, M., & Roese, N. J. (2011). Regrets of the typical American: Findings from a nationally representative sample. *Social Psychological and Personality Science, 2*, 576–583. doi:10.1177/1948550611401756

Norenzayan, A., Gervais, W. M., & Trzesniewski, K. H. (2012). Mentalizing deficits constrain belief in a personal God. *PLoS ONE*, e36880. doi:10.1371/journal.pone.0036880

Piazza, J., Bering, J. M., & Ingram, G. (2011). "Princess Alice is watching you": Children's belief in an invisible person inhibits cheating. *Journal of Experimental Child Psychology, 109*, 311–320. doi:10.1016/j.jecp.2011.02.003

Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences, 4*, 515–526. doi:10.1017/S0140525X00076512

Reb, J. (2008). Regret aversion and decision process quality: Effects of regret salience on decision process carefulness. *Organizational Behavior and Human Decision Processes, 105*, 169–182.

Richard, R., van der Pligt, J., & De Vries, N. K. (1996). Anticipated regret and time perspective: Changing sexual risk-taking behavior. *Journal of Behavioral Decision Making, 9*, 185–199.

Roese, N. J., & Summerville, A. (2005). What we regret most... and why. *Personality and Social Psychology Bulletin, 31*, 1273–1285. doi:10.1177/0146167205274693

Rosenzweig, E., & Gilovich, T. (2012). Buyer's remorse or missed opportunity? Differential regrets for material and experiential purchases. *Journal of Personality and Social Psychology, 102*, 215–223. doi:10.1037/a0024999

Saroglou, V. (2002). Religion and the five factors of personality: A meta-analytic review. *Personality and Individual Differences, 32*, 15–25. doi:10.1016/S0191-8869(00)00233-6

Shariff, A. F., Cohen, A. B., & Norenzayan, A. (2008). The devil's advocate: Secular arguments diminish both implicit and explicit religious belief. *Journal of Cognition and Culture, 8*, 417-423. doi:10.1163/156853708X358245

Shariff, A. F., & Norenzayan, A. (2007). God is watching you: Priming God concepts increases prosocial behavior in an anonymous economic game. *Psychological Science, 18*, 803–809. doi:10.1111/j.1467-9280.2007.01983.x

Shariff, A. F., Norenzayan, A., & Henrich, J. (2009). The birth of high gods: How the cultural evolution of supernatural policing agents influenced the emergence of complex, cooperative human societies, paving the way for civilization. In M. Schaller, A. Norenzayan, S. J. Heine, T. Yamagishi, & T. Kameda (Eds.), *Evolution, culture, and the human mind* (pp. 119–136). New York: Psychology Press.

Sosis, R., & Bressler, E. R. (2003). Cooperation and commune longevity: A test of the costly signaling theory of religion. *Cross-Cultural Research, 37*, 211–239. doi:10.1177/1069397103037002003

Spranca, M., Minsk, E., & Baron, J. (1991). Omission and commission in judgment and choice. *Journal of Experimental Social Psychology, 27*, 76–105. doi:10.1016/0022-1031(91)90011-T

Strahan, E. J., Spencer, S. J., & Zanna, M. P. (2002). Subliminal priming and persuasion: Striking while the iron is hot. *Journal of Experimental Social Psychology, 38*, 556–568. doi:10.1016/S0022-1031(02)00502-4

Wagenmakers, E.-J. (2007). A practical solution to the pervasive problems of *p* values. *Psychonomic Bulletin & Review, 14*, 779–804. doi:10.3758/BF03194105

Watson, D., & Clark, L. A. (1994). *The PANAS-X: Manual for the positive and negative affect schedule-expanded form*. Ames, IA: The University of Iowa.

Zhong, C. B., Bohns, V. K., & Gino, F. (2010). Good lamps are the best police: Darkness increases dishonesty and self-interested behavior. *Psychological Science, 21*, 311–314. doi:10.1177/0956797609360754

APPENDIX A

Religiosity scale used in Experiments 1, 2, and 3 (Shariff, Cohen, & Norenzayan, 2008).

1) My personal religious beliefs are very important to me.
2) My religion or faith is an important part of my identity.
3) If someone wanted to understand who I am as a person, my religion or faith would be very important in that.
4) I believe strongly in the teachings of my religion or faith.
5) I believe in God.
6) I consider myself a religious person.

APPENDIX B

Emotions listed in emotions questionnaires.

Self-Conscious Emotions

angry with self[4], ashamed, blameworthy[4], disgusted with self[4], dissatisfied with self[4], embarrassed, guilty, regretful[4], remorseful

Positive Emotions

active, alert, amused[1], aroused[1], attentive, contemplative[1], determined, enthusiastic, excited, happy[1], interested, inspired, nostalgic[1], proud, strong

Negative Emotions

afraid, angry[3], disappointed[1], disgusted[3], distressed[4], frustrated[2], hostile, irritable, jittery, loathing[2], nervous, scared, scornful[2], upset

[1]Study 1 only

[2]Study 2 only

[3]Studies 1 and 2 only

[4]Studies 2, 3a, and 3b but not Study 1

APPENDIX C

Handwriting task from Study 2 (sentences in Part I derived in part from Sharif & Norenzayan, 2007). Participants in the God condition in Studies 3a and 3b also saw the first essay listed in Part II.

HANDWRITING SAMPLE

We would like to get a sample of your handwriting, both when you are writing short sentences and when you are writing for a longer duration. Please complete the exercises below in your best handwriting.

PART I: Short Samples

Directions: Please copy each of the sentences below in your best handwriting.

1) She is extremely happy.
2) [God is always watching. / Whistle this song.]
3) He threw a fun party.
4) Zebras have many stripes.
5) Try it just once.
6) [He sees everything. / Drive on the road.]
7) I have a question.

PART II: Long Sample

Directions: Please answer the question below in your best handwriting. To ensure that we get an adequate sample, please fill at least half the page with your answer.

[God condition:] Think about what you believe about God. If you do not believe in God, try to imagine what other people believe about God. Below, try to answer the question, "What does God know?" To help you write a full response, you might think about what kinds of things God pays attention to or cares about or how God knows things.

[Control condition:] Think about your favorite Professor. Below, try to answer the question, "What does your Professor know?" To help you write a full response, you might think about what kinds of things your Professor pays attention to or cares about or how your Professor knows things.